

PATENT
137682 (SPLG 12553-1053)

Remarks

Claims 1-27 are pending in this application. Claims 1-27 are rejected. No new matter has been added. It is respectfully submitted that the pending claims define allowable subject matter.

As an initial matter, claim 25 has been amended to correct a minor typographical error.

Claims 1-9 and 21-27 have been rejected under 35 U.S.C. § 112, second paragraph, as being indefinite with respect to whether claims 1 and 21 include a single transceiver channel embodiment because the term "elements" is only present in the plural sense in the preamble. Applicants submit that these claims are not limited to a single channel embodiment and all variants described in the Office Action are encompassed by these claims. One or more transceiver channels may be provided in connection with the transducer elements. Applicants respectfully submit that the clarification requested by the Examiner has been met and the rejection under 35 U.S.C. § 112, second paragraph, has been overcome.

Claims 1-9 and 21-27 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Peterson et al. (U.S. Patent 6,050,645) or alternatively under 35 U.S.C. § 103(a) as being obvious based on Peterson et al. in view of Phelps et al. (U.S. Patent 6,891,311). Applicants respectfully traverse these rejections.

Peterson et al. describes an ultrasound front end circuit employing passive elements that electrically couple a transducer element to a receiver during reception and electrically decouple both the transducer and a transmitter from the receiver during transmission. The circuit further electrically couples the transducer to the transmitter during transmission and electrically decouples both the transducer element and the receiver from the transmitter during reception (column 2, lines 27-57). For example, a receiver stage 231 includes a diode limiter circuit 214, embodying a non-linear impedance Z1, and a receiver preamplifier 220. The transmit output stage 201 includes a signal source 230 and a transmit switch 224 which embodies the impedance

PATENT
137682 (SPLG 12553-1053)

Z3. The transmit switch 224 includes an inverse parallel circuit of two diodes 226, 228 having opposite polarities connected between the transmit signal source 230 and node 232. The transmit output stage 201 is configured to provide a pulse at the node 232 sufficient to drive the transducer 224 to ultrasound oscillation. The transducer 224 is similarly configured to receive ultrasound signals reflected back from an object and convert the echo pulses into echo signals that are then fed into receiver input stage 231 at the node 234. The system 200 further includes a diode bridge 202 coupled across node 232 which, in conjunction with the diode limiter 214, acts to decouple the receiver and transmitter by alternately grounding nodes 232 and 234. A DC bias current source 212 is coupled across the diode bridge at the nodes 250 and 251 (column 6, lines 25-44). Other embodiments including similar structures and configurations are also provided.

Phelps et al. describes an ultrasound transmit pulser that includes an H-bridge of four transistors with a first switch and second switch connecting a power source to either transducer elements or a receive amplifier. A diode clamp is used to control voltage levels (column 2, lines 2-40).

Independent claim 1, as amended, recites transceiver circuitry for ultrasound transducer elements comprising a receive section comprising "a receive section input; a receive section output and transmit signal blocking circuitry coupled between the receive section input and the receive section output including a coupling capacitor." Peterson et al. alone or in combination with Phelps et al. fails to describe or suggest such circuitry.

Peterson et al. and Phelps et al. include circuitry having switching and diode arrangements to electrically couple and decouple the transmitter from the receiver. However, neither reference describes or suggests the use of a capacitor when performing the coupling or decoupling functions. In contrast to the claimed coupling capacitor recited in claim 1, there is simply no description or suggestion of protecting any components, for example, signal processors using any type of decoupling or coupling capacitors. Thus, Peterson et al. alone or in combination with Phelps et al. does not describe or suggest circuitry as recited in claim 1.

PATENT
137682 (SPLG 12553-1053)

Claims 2-9 depend from independent claim 1. When the recitations of claims 2-9 are considered in combination with the recitations of claim 1, Applicants submit that dependent claims 2-9 are likewise patentable over Peterson et al. alone or in combination with Phelps et al. for at least the same reasons set forth above.

Independent claim 21, as amended, recites a method for transmitting and receiving signals through ultrasound transducer elements comprising "coupling a receive signal through a receive section input, a receive section output, and transmit signal blocking circuitry coupled between the receive section input and the receive section output, the transmit signal blocking circuitry including a coupling capacitor." Peterson et al. alone or in combination with Phelps et al. fails to describe or suggest such a method.

As discussed in more detail above in connection with claim 1, Peterson et al. and Phelps et al. do not include transmit signal blocking circuitry coupled between the receive section input and the receive section output with the transmit signal blocking circuit including a coupling capacitor. Thus, Peterson et al. alone or in combination with Phelps et al. does not describe or suggest a method as recited in claim 21.

Claims 22-27 depend from independent claim 21. When the recitations of claims 22-27 are considered in combination with the recitations of claim 21, Applicants submit that dependent claims 22-27 are likewise patentable over Peterson et al. alone or in combination with Phelps et al. for at least the same reasons set forth above.

Claims 10-16 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Peterson et al. in view of Phelps et al. Applicants respectfully traverse this rejection.

Peterson et al. and Phelps et al. are described and discussed in more detail above.

Independent claim 10 recites an ultrasound probe comprising transceiver circuitry comprising "a transmit section output coupled through receive signal blocking circuitry and a

PATENT
137682 (SPLG 12553-1053)

coupling capacitor to transmit transducer elements comprising a transmit aperture.” Peterson et al. alone or in combination with Phelps et al. fails to describe or suggest such a probe.

As discussed in more detail above in connection with claim 1, Peterson et al. and Phelps et al. do not include circuitry having any type of decoupling or coupling capacitors. Thus, Peterson et al. alone or in combination with Phelps et al. does not describe or suggest a probe as recited in claim 10.

Claims 11-16 depend from independent claim 10. When the recitations of claims 11-16 are considered in combination with the recitations of claim 10, Applicants submit that dependent claims 11-16 are likewise patentable over Peterson et al. in combination with Phelps et al. for at least the same reasons set forth above.

Claims 17 and 18 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Peterson et al. in view of Phelps et al. and further in view of Larson, III (U.S. Patent 5,229,933). Applicants respectfully traverse this rejection.

Peterson et al. and Phelps et al. are described and discussed in more detail above. Even from a cursory reading of Larson, III, this reference fails to make up for the deficiencies in the Peterson et al. and Phelps et al. references. Further, claims 17 and 18 depend from independent claim 10. Applicants respectfully submit that these claims are likewise patentable over the combination of Peterson et al. in view of Phelps et al. and Larson, III based at least on the dependency of these claims from claim 10.

Claims 19 and 20 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over Peterson et al. in view of Phelps et al. and further in view of Fraser (U.S. Patent 6,375,617). Applicants respectfully traverse this rejection.

Peterson et al. and Phelps et al. are described and discussed in more detail above. Even from a cursory reading of Fraser, this reference fails to make up for the deficiencies in the Peterson et al. and Phelps et al. references. Further, claims 19 and 20 depend from independent

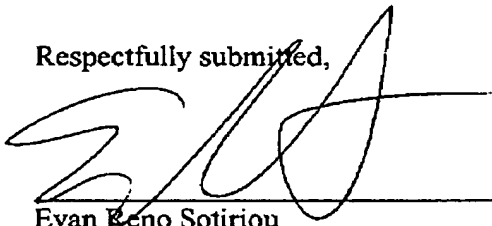
PATENT
137682 (SPLG 12553-1053)

claim 10. Applicants respectfully submit that these claims are likewise patentable over the combination of Peterson et al. in view of Phelps et al. and Fraser based at least on the dependency of these claims from claim 10.

Thus, for at least the reasons set forth above, Applicants respectfully request that the 35 U.S.C. § 102(b) rejection of claims 1-9 and 21-27, and the 35 U.S.C. § 103(a) rejection of claims 1-27 be withdrawn.

In view of the foregoing amendments and remarks, it is respectfully submitted that the prior art fails to teach or suggest the claimed invention and all of the pending claims in this application are believed to be in condition for allowance. Reconsideration and favorable action is respectfully solicited. Should anything remain in order to place the present application in condition for allowance, the Examiner is kindly invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,



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